2011 Imaging Criteria

Magnetic Resonance Imaging (MRI), Abdomen[1]

CLIENT:	Name	D.O.B.	ID#	GROUP#
CPT/ICD9:	Code	Facility	Service Date	
PROVIDER:	Name		ID#	Phone#
	Signature		Date	

ICD-9-CM: 88.97

INDICATIONS (choose one and see below)

- ☐ 100 Liver mass by US/CT
- ☐ 200 Complex cystic/indeterminate/solid renal parenchymal mass
- ☐ 300 Abdominal mass by PE/KUB/US and CT not feasible/nondiagnostic for etiology of mass
- ☐ 400 Suspected AAA rupture ♦
- ☐ 500 Suspected pheochromocytoma
- ☐ 600 Suspected adrenal cortical tumor (cortisol secreting)
- ☐ 700 Suspected aldosterone-producing adrenal tumor/bilateral adrenal hyperplasia
- ☐ 800 Periodic assessment of adrenal mass
- ☐ Indication Not Listed (Provide clinical justification below)

☐ 100 Liver mass by US/CT[2]

☐ 200 Complex cystic/indeterminate/solid renal parenchymal mass **[Both]**[3]
- ☐ 210 By US
- ☐ 220 CT not feasible/nondiagnostic for etiology of mass[4]

☐ 300 Abdominal mass by PE/KUB/US and CT not feasible/nondiagnostic for etiology of mass[4, 5]

☐ 400 Suspected AAA rupture **[One]** ♦[6]
- ☐ 410 Known AAA **[All]**
  - ☐ 411 By Hx/imaging
  - ☐ 412 New onset back/abdominal/flank pain[7]
  - ☐ 413 CT nondiagnostic/not feasible[8]
- ☐ 420 Suspected AAA **[All]**
  - ☐ 421 New onset back/abdominal/flank pain[7]
  - ☐ 422 Findings **[One]**
    - ☐ -1 Abdominal mass by PE

- ☐ -2 Calcification suggestive of AAA by x-ray
- ☐ -3 Hemodynamic instability **[One]**
  - ☐ A) Systolic BP < 100 mmHg
  - ☐ B) Decrease in systolic BP ≥ 30 mmHg from baseline
  - ☐ C) Shock by PE[9]
- ☐ 423 CT nondiagnostic/not feasible[8]

☐ 500 Suspected pheochromocytoma **[One]**[10, 11, 12]
- ☐ 510 24 hr urine **[One]**
  - ☐ 511 VMA/metanephrine > normal
  - ☐ 512 Total catecholamines > normal
- ☐ 520 Plasma catecholamine > normal

☐ 600 Suspected adrenal cortical tumor (cortisol secreting) **[All]**[13*MDR, 14, 15]
- ☐ 610 24 hr urine free cortisol > normal[16]
- ☐ 620 No suppression by low-dose dexamethasone[17]
- ☐ 630 No suppression by high-dose dexamethasone[18]

☐ 700 Suspected aldosterone-producing adrenal tumor/bilateral adrenal hyperplasia **[All]**[19]
- ☐ 710 Aldosterone > normal
- ☐ 720 Plasma renin < normal
- ☐ 730 Contributory conditions excluded[20]
- ☐ 740 Medications deemed noncontributory[20]
- ☐ 750 CT nondiagnostic/not feasible[4]

☐ 800 Periodic assessment of adrenal mass **[All]**[21]
- ☐ 810 Nonfunctioning mass[22, 23]
- ☐ 820 Size **[One]**[24]
  - ☐ 821 ≤ 4 cm
  - ☐ 822 > 4 cm and ≤ 6 cm and no surgery planned[25]
- ☐ 830 Periodic assessment **[One]**[26]
  - ☐ 831 12 wks after initial Dx
  - ☐ 832 Every 6 mos after initial Dx

Notes

(1)
The following are examples of relative and absolute contraindications to the use of magnetic resonance imaging:
• Implanted devices that are electrically or magnetically activated (e.g., cardiac pacemakers, automatic cardioverter defibrillators, drug infusion pumps, cochlear implants)
• Ferromagnetic metal objects (e.g., cerebral aneurysm clips, intraocular metallic foreign body, prostheses, screws)

- Pregnancy, first trimester
- Renal insufficiency in cases when magnetic resonance imaging is performed with gadolinium-based contrast

(2)
US is the initial diagnostic test of choice for suspected biliary or liver disease (Ros and Mortele, Clin Liver Dis 2002; 6(1): 1-16). Liver masses may be incidental findings discovered during US performed for another indication. In general, US or contrast-enhanced CT are adequate for classifying the majority of focal liver lesions, particularly cysts, metastases, and hemangiomas. MRI is also helpful in defining focal nodular hyperplasia, focal fatty infiltration, lesions < 2 cm, or those lesions adjacent to large blood vessels or the heart (Harisinghani and Hahn, Gastroenterol Clin North Am 2002; 31(3): 759-776, vi).

(3)
A complex cyst, indeterminate renal mass, or solid renal mass by US will need CT or MRI for characterization (Zhang et al., Radiol Clin North Am 2007; 45(1): 119-147). Simple cysts found on US do not need follow-up since these are benign; however complex masses not fulfilling the criteria for cyst are considered indeterminate and require further evaluation by contrast-enhanced CT or MRI (American College of Radiology (ACR), ACR Appropriateness Criteria: indeterminate renal masses. 2008). Whether to perform CT or MRI is a matter of clinical judgment.

(4)
CT may not be feasible in patients with renal insufficiency or an allergy to contrast.

(5)
CT is preferred to MRI to evaluate patients with an abdominal mass. CT is superior to MRI in evaluating solid organs, the bowel, and the presence of pathology in this region. Results of FOBT, urinalysis, or other simple tests may direct the provider to more organ-specific tests.

(6)
These criteria address imaging of an AAA in a patient with symptoms worrisome for aneurysm rupture. US is the most appropriate study to identify and follow an AAA in an asymptomatic patient, and is also the most cost-effective method for serial size documentation (Chaikof et al., J Vasc Surg 2009; 50(4 Suppl): S2-49; Sparks et al., Am Fam Physician 2002; 65(8): 1565-1570). CT or MRI is indicated in patients with symptoms of AAA expansion or impending rupture (e.g., back, flank or abdominal pain) because US cannot document an aneurysmal leak. CT is the imaging method of choice in diagnosing acute aortic pathology and is the primary modality for preoperative planning (Chaikof et al., J Vasc Surg 2009; 50(4 Suppl): S2-49). If the patient is unstable and the clinical suspicion is high for a AAA, the patient should proceed to surgery without imaging evaluation (Rakita et al., Radiographics 2007; 27(2): 497-507; Barkin and Rosen, Emerg Med Clin North Am 2004; 22(3): 675-682).

(7)
These symptoms may signal impending rupture of the aneurysm and are thought to be caused by acute expansion of the vessel wall or bleeding (Assar and Zarins, Postgrad Med J 2009; 85(1003): 268-273).

(8)
CT is the imaging method of choice for evaluating acute aortic pathology (Hartnell, J Thorac Imaging 2001; 16(1): 35-46).

(9)
PE findings in shock include clouded sensorium, hypotension, decreased urine output, tachycardia, and cool, mottled extremities with diminished or absent peripheral pulses.

(10)
A pheochromocytoma is an adrenal tumor that produces, stores, and secretes catecholamine. Approximately 90% of pheochromocytomas are benign, 10% are malignant, and 10% are bilateral (Israel and Krinsky, Radiol Clin North Am 2003; 41(1): 145-159). They are a very rare but potentially lethal cause of HTN. Most patients present in mid-adult life with refractory HTN or "spells" of sudden onset headache, sweating, and palpitations. Other symptoms include tremor, anxiety, nervousness, fatigue, unexplained abdominal or chest pain, and weight loss.

(11)
The diagnosis of pheochromocytoma is usually established by demonstrating increased urinary excretion of catecholamines or catecholamine metabolites (metanephrine and VMA). The preferred screening method involves a 24-hour collection of urine obtained during a period of "spells" or HTN. Plasma catecholamine measurement (total and fractionated) can also be performed, but it is more expensive, more difficult to obtain because of the need for ideal conditions (patient in a totally nonstimulated restful state at time of

blood draw), and is less sensitive and specific than a 24-hour urine catecholamine measurement.
Prior to obtaining the sample, the patient should rest and ideally discontinue all medications. At the very least, those drugs known to interfere with catecholamine assays (e.g., amphetamines, ethanol, methyldopa, quinidine, theophylline) should be avoided prior to testing.

(12)

The majority (90%) of pheochromocytomas are intra-adrenal lesions and are usually identified by MRI or CT (Fauci, ed. Harrison's principles of internal medicine. 2008). MRI may offer an advantage over CT by providing the anatomic relationship between the tumor and its surrounding structures (Vaughan, Med Clin North Am 2004; 88(2): 443-466). MRI is becoming the imaging study of choice for diagnosing pheochromocytomas (Elsayes et al., AJR Am J Roentgenol 2005; 184(3): 860-867). The addition of MIBG scintigraphy may improve sensitivity for diagnosing pheochromocytoma when catecholamine levels are normal (Guller et al., Ann Surg 2006; 243(1): 102-107).

(13)-MDR:

Some patients with adrenal cortical tumors have Cushingoid findings without lab abnormalities. Requests for imaging in these cases require secondary medical review.

(14)

CT is the primary imaging modality for investigating an adrenal mass and can determine tumor size, tumor relationship to surrounding structures, lymph node involvement, and the presence of distant metastases (Jossart et al., Endocrinol Metab Clin North Am 2000; 29(1): 57-68, viii). Measurement of the fat content in Hounsfield units can distinguish benign from malignant lesions; higher values signify more fat and are less likely to be malignant. A value < 10 HU has been established by the NIH as the threshold for determining adrenal malignancy (Gopan et al., Cleve Clin J Med 2006; 73(6): 561-568). MRI is helpful in tissue characterization and is indicated when malignancy is suspected. Various MRI techniques can be used to distinguish adrenal adenomas from metastases (Sohaib et al., Best Pract Res Clin Endocrinol Metab 2005; 19(2): 293-310; Israel and Krinsky, Radiol Clin North Am 2003; 41(1): 145-159).

(15)

Whether to perform CT or MRI in this situation is a matter of clinical judgment.

(16)

Cortisol hypersecretion is demonstrated by 24-hour urine tests. Three 24-hour urine samples may be necessary when the initial test is normal and the index of suspicion is high (Vaughan, Med Clin North Am 2004; 88(2): 443-466; Arnaldi et al., J Clin Endocrinol Metab 2003; 88(12): 5593-5602).

(17)

In the overnight low-dose dexamethasone test, dexamethasone is given between 11 PM and 12 AM and a fasting plasma cortisol measurement is taken the next morning between 8 AM and 9 AM. Recently the normal level of suppression has changed from less than 5 µg/dL to less than 1.8 µg/dL, improving the sensitivity of this test in detecting patients with Cushing's syndrome. Patients with cortisol levels below 1.8 µg/dL do not have active Cushing's syndrome. This outpatient screening option is easy to perform and cost-effective. A low-dose dexamethasone suppression test can also be performed over a two day period (Arnaldi et al., J Clin Endocrinol Metab 2003; 88(12): 5593-5602).

(18)

Suppression of cortisol excretion with high-dose dexamethasone is useful in distinguishing Cushing's disease (an ACTH-secreting pituitary adenoma) from other forms of Cushing's syndrome. Failure to suppress plasma or urine corticosteroids generally indicates an adrenal cortical or ectopic ACTH-secreting tumor; suppression of corticosteroids supports the diagnosis of a pituitary adenoma instead. Individuals with pituitary disease should demonstrate suppression in cortisol of 50% or more (Vaughan, Med Clin North Am 2004; 88(2): 443-466).

(19)

Primary hyperaldosteronism stems from either an adrenal tumor (benign adenoma or rarely, adrenal carcinoma) or bilateral adrenal hyperplasia. Symptoms and findings of primary hyperaldosteronism may include HTN, headaches, muscle weakness, hypokalemia and hypernatremia (Fauci, ed. Harrison's principles of internal medicine. 2008; Vaughan, Med Clin North Am 2004; 88(2): 443-466). CT of the adrenal glands is the imaging study of choice in making the distinction between unilateral adenoma and bilateral adrenal hyperplasia (Al Fehaily and Duh, Surg Clin North Am 2004; 84(3): 887-905; Vaughan, Med Clin North Am 2004; 88(2): 443-466). CT is able to see smaller lesions, is technically easier to perform, and is more cost-effective than MRI. Aldosterone-secreting tumors are generally resected, while bilateral adrenal hyperplasia is usually managed medically (South-Paul et al., Current diagnosis & treatment

in family medicine. 2004, xv, 750 p. p.).

(20)

Medications (e.g., B-adrenergic blockers, spironolactone, ACE inhibitors, calcium channel blockers, diuretics, and NSAIDs) and factors such as high sodium intake, older age, renal insufficiency can interfere with the laboratory testing for primary hyperaldosteronism (Al Fehaily and Duh, Surg Clin North Am 2004; 84(3): 887-905).

(21)

Many adrenal tumors are discovered incidentally during imaging studies performed for unrelated reasons, with an estimated range of incidence from 0.1% to 4.3%. The likelihood of discovering an adrenal mass increases with age (Grumbach et al., Ann Intern Med 2003; 138(5): 424-429). Management decisions are dependent upon the risk of underlying malignancy or hormonal hypersecretion, which correlate with the size of the mass, its radiographic appearance, and its present secretory activity (Young, N Engl J Med 2007; 356(6): 601-610; Gopan et al., Cleve Clin J Med 2006; 73(6): 561-568; National Institutes of Health, NIH Consens State Sci Statements 2002; 19(2): 1-25). All patients with an incidentally discovered adrenal mass should be screened for pheochromocytoma and Cushing's syndrome.

(22)

The evaluation of an adrenal mass includes an assessment of hormonal function, tumor size, and tumor growth. The need for biopsy has been significantly reduced due to the high specificity of new imaging techniques in determining benign from malignant disease (Sohaib et al., Best Pract Res Clin Endocrinol Metab 2005; 19(2): 293-310). Pheochromocytoma should be excluded before attempting adrenal biopsy to avoid the potential for hypertensive crisis.

(23)

Appropriate laboratory screening tests include 24-hour urinary free cortisol, metanephrines, catecholamines, vanillylmandelic acid, and potassium levels (if hyperaldosteronism is suspected) (Higgins, Clin Fam Pract 2002; 4(3): 505).

(24)

Various size cutoffs have been cited in the literature. The risk of malignancy is much less for adrenal tumors < 6 cm. According to the National Institutes of Health, tumors > 6 cm in size should be excised, while those < 4 cm can be observed. In patients with tumors between 4 and 6 cm, however, factors in addition to size should be considered (Grumbach et al., Ann Intern Med 2003; 138(5): 424-429; National Institutes of Health, NIH Consens State Sci Statements 2002; 19(2): 1-25).

(25)

Nonfunctioning tumors > 4 cm in size or tumors which have increased in size by serial imaging or appear malignant should be removed since the probability of adrenal carcinoma is higher in these cases (Young, N Engl J Med 2007; 356(6): 601-610; Sturgeon and Kebebew, Surg Clin N Am 2004; 84: 755-774).

(26)

Nonfunctioning adrenal masses should undergo periodic assessment by serial imaging (commonly done at 6, 12, and 24 months) to assess for changes in size (Young, N Engl J Med 2007; 356(6): 601-610). Since size correlates with the risk of malignancy, any change in size should prompt referral to a specialist for evaluation.